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of the area under examination consist of gneiss which is probably of Laurentian age, the Canadian rocks extending into Polar area. These are followed by unfossiliferous slates and grits, known as the Cape Rawson beds, which are evidently older than the fossil-bearing Upper Silurians. It is proved, indeed, by the recent expedition, that Lower Silurian rocks exists in Grinnell and Hall Lands, thus disproving Murchson's view that the Polar area was dry land during the Lower Silurian period. Sixty species of fossils have been determined by Mr. Etheridge, ranging from the Lower to the Upper Silurian, and including some characteristic forms of Llandecilo and Wenlock age. The cream-colored dolomites found in abundance by some of the previous explorers are believed to represent the whole of the Silurian, and perhaps part of the Devonian period. True marine Devonians have been discovered for the first time in Grinnell Land. Here, too, the carboniferous limestone was found rising to a height of 2000 feet. This formation extends to the most northern point yet reached, and probably strikes beneath the Polar Sea to Spitzbergen. About thirty species, chiefly Brachiopods and Polyzoa, were procured from the carboniferous limestones of Cape Joseph Henry, the most northerly of the twenty localities from which fossils were collected.

Mr. Etheridge points out the greater resemblance of the Arctic palæozoic fauna to that of America than to that of Europe. No mesozoic rocks are known until we reach the cretaceous strata, which are represented in Greenland by plant-bearing beds that indicate by their fossils a warm climate something like that of Egypt at the present day. The vegetation of the miocene beds in the Arctic regions points to climatal conditions about thirty degrees warmer than those which at present prevail. The miocene beds of Grinnell Land contain the common fir (*Pinus abies*) the birch, poplar, and other trees similar to those which occur in Spitzbergen. A seam of miocene coal, thirty feet in thickness, was discovered by the expedition at Lady Franklin Sound.—*Academy*.

GEOGRAPHY AND TRAVELS.¹

COLONEL PREJEVASKY'S THIRD JOURNEY.—This distinguished Russian explorer has sent, under date of August, 1877, to the Russian Geographical Society, a report of a third journey in Central Asia. Translations of this report have been made by Dr. Petermann, published as a supplement to his *Mittheilungen*, with the original route maps and an Uebersichts-Karte of his journeys from 1872 to 1877; and also by Dr. R. Kiepert for the *Globus*. At the meeting of the Berlin Geographical Society, on the 6th of April last, Herr Von Richthofen read a very interesting paper upon the results of this journey. Colonel Prejevasky was most fortunate

¹ Edited by ELLIS H. YARNALL, Philadelphia.

in making this exploration at a period when this region was held by Yakub-beg, at that time the ruler of Kashgar, who was assassinated about the middle of last year, and his kingdom overthrown by the Chinese. Neither a year earlier, nor at the present time, would such an expedition have been practicable. Leaving Kuldja, August 12th, 1876, he traveled in a general south-east direction, crossing the eastern Tian-Shan by a pass 9800 feet in height, called the Narat, and found that the rain-fall was plentiful on the north side where are abundant forests and game, but wholly deficient on the south side. He then entered upon an extensive plateau called Yuldus, about 8000 feet above the sea. Both in birds and mammalia the Yuldus is very rich. By a pass 9300 ft. in height he descended from this plateau, and before entering Korla (2600 feet, population 6000), on November 4th, 1876, he left behind the last spurs of the Tian-shan. Proceeding to the Valley of the Tarrim he passed a stony strip of country, probably the shore of a former sea, while beyond is a desert consisting of clay and sand. The clay is impregnated with salt, and on both sides of the Tarrim salt marshes are found. On December 18th he arrived at Charchalyk, between the Lob-Nor lake and the lofty mountains of Altyn-tag. He explored the northern slope of this range, which rises precipitously, as an immense wall, to the height of 12,000 to 14,000 feet. South of the Altyn-tag, it was learned, is a plateau of 13,000 feet in height, and beyond, other ranges of mountains, forming an enormous mountain chain covered with perpetual snow. The Tarrim and Lob-Nor desert is the poorest and most desolate region Prejevalsky had ever set eyes on. He then explored the northern face of the Altyn-Tag range which forms the northern escarpment of the Tibetan plateau. The mountains are about 14,000 feet high. These mountains, says the account in the *Geographical Magazine*, are characterized by great sterility, and it is only in the valleys and ravines that vegetation grows; yet, nevertheless, large swarms of locusts are here to be seen. In the summer of 1876 they committed great ravages, and rose to a height of 9000 feet in the mountains. The climate of the Altyn-Tag is characterized on its northern side at least by great cold and little snow. In summer, according to the natives, it rains frequently and is very windy. In this mountain region and the adjacent Kum-Tag desert there are a few wild camels, which twenty years ago were said to have been very common. They seek the upper valleys of the Altyn-Tag in the summer and the most inaccessible deserts in the winter. Their sight, sense of hearing and of smell are exceedingly quick, a striking contrast to the domesticated camel, which is just the opposite. Lob-Nor lake is supplied by the Tarrim river; it is shallow, overgrown with reeds and is for the most part a morass, the water being fresh, though there are salt marshes all around it. The inhabitants about the lake speak a language most like that of Khotan. The

exploration was made just before the invasion of the Chinese, the inhabitants being of Aryan stock and of the religion of Islam.

The Lob-Nor lake is elliptical in shape, is 90 or 100 versts in length and 20 versts in breadth. It is 2200 feet above the sea level. It is much overgrown with weeds, and, though surrounded by salt marshes, the water is clear and sweet.

The flights of birds of passage which make a resting-place of Lob-Nor in their migrations, were very carefully observed by Prejevalsky, millions during February passing on their way across the desert. None came from the south across the lofty and cold plateau of Tibet, but cross it where it is narrowest, *i. e.*, in the direction of Khotan. The region explored by Prejevalsky lies to the north of Tibet. The article is illustrated by a map.

On all sides, this great depression, forming a basin surrounded by the loftiest mountains of the globe, has been approached by the English and Russians, but never visited by any scientific or intelligent travelers. On our maps this basin of the Lob-Nor has been placed far beyond the great central mountain range of the Kuen-Lun, and nearer the Tian-shan system; whereas, according to Prejevalsky, it lies at the foot of the Altyn-tag, which he believes is, without doubt, the northern rampart of that mighty region of mountain and plateau, whose southern boundary rises over the plains of India, and thus extends in breadth over nearly thirteen degrees latitude—a distance equal to that from Naples to Hamburg.

In concluding his examination of the results of this very successful exploration, Herr Von Richthofen remarks that new discoveries bring new problems, as, for instance, the existence of a body of fresh water in a spot where all former accounts tell of a great salt sea, and where every theoretical conclusion would confirm us in the belief that such was the case. Count Béla Szécsenyi has already departed from Shanghai with the expectation of reaching the southern side of the Tarrim basin.

Meanwhile Col. Prejevalsky left Kuldja on August 28th, 1877, for Guchen, intending to penetrate into Tibet by Hami, Tsaidam and the upper course of the Yang-tse. Unfortunately, after reaching Guchen, sickness obliged him to return to Zaissan, and he is now on his way home to St. Petersburg.

A more recent journey by Captain Gill, in Western China, supplies, states the *Geographical Magazine*, an interesting confirmation of the apparent existence of a belt of exceedingly moist region between the Tibetan plateau and the lands encompassing it on its north-eastern and eastern sides. Prejevalsky, in his "Mongolia and Tangut Country," notices this feature while ascending the mountains south-west of Taging; the Père Armand David noticed it during his residence at Mupin, north of Ching-tu-fu; Mr. Cooper, while making his way from the last-named

place into eastern Tibet; and Captain Gill's testimony now supplies us with a link between the observations of Prejevalsky and David, as he speaks of the wonderfully moist and semi-tropical character of the vegetation on the eastern side of the plateau, between the valleys Sung-pan-ting and Ling-ngan, on the extreme northern border of the province of Se-chuen.

DUTCH ARCTIC EXPEDITION.—The Willem Barentz, a two-masted schooner of eighty tons, built expressly for this service, with a crew of fourteen men, three officers, a zoölogist, a doctor, a photographer and eight sailors, sailed from Ijmuiden on the 5th of May, upon what may be regarded as an experimental voyage to Jan Mayen Island, thence to Spitzbergen, examining the edge of the ice en route, and calling at Amsterdam Island. Afterwards they hope to visit Novaya Zemlya and the Barentz Sea, returning home in October. Deep sea soundings will be made, and observations taken of the fauna, and flora; strength, and direction of currents; in magnetism, and meteorology. The expedition is supported by the contributions of Dutchmen.

GEOGRAPHICAL NEWS.—The last (June) number of Petermann's *Mittheilungen* contains a very interesting account of the application of the process of helio-gravure, by the Austrian Military Geographical Institute, to the production of the new maps of the Austro-Hungarian Empire. The maps are prepared on a scale of 1-60,000, and reduced photographically to a scale of 1-75,000. The (sun) engraving upon copper by the new process requires only about four weeks, whilst the engraving by hand would need forty-two months. The first sheets of this new map were issued in 1873; and, at the end of 1877, 271 were published, and it is expected that the whole number (715) will be completed within 10 or 12 years from the commencement of publication; whereas by the usual method a period of fifty to sixty years must have elapsed before the accomplishment of the work. The cost of the new process is only one-fourth that of the old. As regards the artistic appearance of these maps a specimen given in the *Mittheilungen* is most favorable; the impression being clear and sharp, and likely to deceive even an engraver.

The first volume of Dr. F. Ratzel, on the Geography of the United States, relating to physical geography, has lately been published. A second volume, on Social Geography, will next appear.

The *Geographical Magazine*, for June, gives the results of Nares' Narrative of a Voyage to the Polar Sea during 1875-76. Also a very complete map of the African Lake Region, with a notice of the advance sheets of Stanley's book. The map marks an era in African cartography. The review closes with this paragraph "Great as the value of Mr. Stanley's geographical research-

es are, and absorbing as is the interest excited by his narrative, we are inclined to attribute equal importance to the ethnological portions of his first volume. He has been most assiduous in collecting and arranging information respecting the habits and modes of life of the people, their arts and manufacture, and his account of the kingdom and people of Uganda, especially, is most valuable."

Mr. Alfred R. Wallace writes to *Nature*, June 20, 1878, to correct an error "in almost every detailed map of Australia, including some of the latest," consisting of a note placed at the head of the Alligator river in about S. Lat., $13\frac{1}{2}^{\circ}$, and E. Long., 133° —"steep walls, 3800 feet." He shows the absurdity of the existence of such precipices in a country where there are no important mountains, and only moderately elevated plateaus, and the fact that the supposed authority for the remarks, *Leichardt's Journal*, contains no such statement.

The failure of Congress to make an appropriation for Captain Howgate's Expedition to the Arctic regions, will compel Captain Tyson and his advance party, sent out last year, to return, as they were instructed to do, if the main expedition did not arrive at Disco by the latter part of August.

From dispatches to the *New York Tribune* and the *Philadelphia Press*, we learn, that this season Major Powell's labors will be mostly within the limits of Northern Arizona and Southern Utah. He expects to survey the region south of the grand cañon of the Colorado river, including the plateau country where the Moqui towns are situated. Of the seven rectangular sections (containing about 12,000 square miles each), included in his field of labor, maps of four have been completed, and it is hoped to complete the remaining three this year.

Dr. F. V. Hayden's corps will be engaged in Idaho and Montana. The area to be surveyed includes the Yellowstone National Park and the country lying to the south and south-east about the head of the Green, Snake, and Mud rivers. This will be an extension of the work of last year. Within this area is what is regarded as the true apex of the continent, its three greatest rivers, the Missouri, the Columbia and the Colorado rising in a peak in the northern end of the Mud River range. Lieutenant Wheeler's corps will be divided into three sections known as the Colorado, Utah and California sections.

The Colorado section will carry on its work chiefly in New Mexico, along the valley of the the Rio Grande to the Mexican border, and between that and the Pecos. The Utah section, owing to the Indian troubles, will be transferred to California, and will operate along the Sierras, to join the triangulation from the base of Virginia City, to that from the base of Los Angeles to the north and east. The California section will move north from Fort Bidwell, and will examine an area of 16,000 square miles into

the Columbia River basin. Another portion will move south from Carson, Nevada, and occupy triangulation points on the Sierras, and survey a portion of the range south of Mono Lake. A party is assigned to the Washoe mining region.

The Atlas of Colorado has now been completed by the U. S. Geological Survey, and gives the results of the labors of Dr. F. V. Hayden, and his corps, in geography and geology.

Colorado is now better known topographically than any other State.

In an article in the *Geographical Magazine*, on the productive zones of Russia in Europe, five of these regions are enumerated. There are, starting from the north, the *tundras*, then the forest and agricultural region (forming three zones), and the steppes. The *tundras*, those bare, damp Arctic wastes, are as a rule to be found between the Arctic Circle and the Polar ocean. They are frozen in winter and generally thaw to the depth of a foot or so in summer. Turf moss (*Sphagnum*) and reindeer moss (*Cladonia rangiferina*) are both to be found, and the latter is a product of economic importance, though in eight or ten days a herd of reindeer will generally exhaust a pasture of it. These animals yield so little milk that it takes at least a hundred of them to support one family. The entire area of the tundras in Europe amounts to about 144,820 square miles (English).

The two-masted schooner Eothen, of 102 tons, a sixteen-year old whaling vessel, recently refitted, sailed from New York on the 19th of June for Repulse Bay. She has on board the members of the Franklin Search Party, consisting of the commander, Lieut. Frederick Schwatka, U. S. A., Col. W. H. Gilder, Joseph Eberling—"Esquimaux Joe," of the Polaris Expedition,—Henry W. Klutchack and F. F. Melters. At Repulse Bay they are to be reinforced by seven Esquimaux, and, as soon as there is sufficient snow, they go by sledging to a point near Cape Engelfield, where they expect to find a cairn containing relics of the Franklin expedition. They are to return during the winter of 1879-1880 to Repulse Bay. They take with them a valuable equipment of scientific instruments and are directed to take daily observations. Dr. John Rae, in a letter to Chief-Justice Daly, President of the American Geographical Society, published in the *New York Herald*, again expresses his disbelief in the existence of this cairn for the following reasons: (1.) That it is most improbable that any of the crew of Franklin's ships should have reached the locality mentioned, situated a distance of 300 miles over the very rough and partially open ice of Boothia Gulf and where no aid could be obtained. (2.) That in 1854, when he visited the regions between Repulse Bay and Boothia Gulf, he examined the Esquimaux of this region, but heard nothing of the existence of this cairn, although they knew of the cairn erected by him near Cape Engelfield in 1847 and of the cache left by

Ross at Victoria Harbor in 1832. (3.) Capt. Hall, in 1868, was within thirty miles of the reported position of the cairn, but heard nothing of it.

MICROSCOPY.¹

MICROSCOPICAL SECTION, TROY SCIENTIFIC ASSOCIATION.—A regular meeting of this Society was held on Monday evening, May 6th, the Chairman, Dr. R. H. Ward, in the chair.

Dr. Ward gave a discussion of some recent experiments in microscopic ruling, an account of which will be published shortly. Rev. A. B. Hervey, Vice-Chairman of the Section, gave a very clear summary of the classification of algæ by means of fructification, and illustrated the six principal groups into which the Red sea-weeds are divided by the following preparations: No. 1, *Ceramium rubrum* Ag., showing in its various stages of development, the fruit produced by the simple subdivision of the cell-contents of a fructified mother-cell; No. 2, *Callophyllis variegata* Ag., having the nucleus of the cystocarp compound, and the masses of spores separated by intervening sterile cells; No. 3, *Plocamium procerum* Ag., from the highest order in the third series, the spores being produced by the gradual development of bead-like strings of small cells, or "spore threads," arising from a common base or centre and often branched, and when fully developed, filling the cystocarp with a mass of sub-angular spores, all the cells of a given spore-thread appearing to develop simultaneously, but some of the threads in these sections, not having been fecundated and developed, appearing in their original state and form; No. 4, *Curdiea laciniata* Harvey, showing characteristic fruit of the series where a mass of fine, closely packed, moniliform "spore threads," arising from a basal placenta, form the spores by the successive ripening and falling off of the end cells of the fecundated threads; No. 5, *Gelidium cartilagineum* Grev., illustrating the series having an immersed cystocarp, a placenta central as in this species or more frequently basal or parietal, and club-shaped spores developed at the end of very short spore threads; and No. 6, *Polysiphonia fibrillosa* Grev., having the cystocarp external and somewhat highly developed, and the spores large and club-shaped. The specimens were mounted in sea-water and glycerine, by the instantaneous method described in the May number of the NATURALIST, and showed the typical fructification of the different series with great distinctness. After study and discussion by the section, the series of slides was tendered as a special box to the "Postal Club."

A regular meeting was held Monday evening, June 3d, Dr. Ward in the chair. The chairman presented a box of slides prepared for the section by Mr. C. C. Merriman, of Rochester, a corresponding member. The slides were mainly the result of Mr.

¹This department is edited by Dr. R. H. WARD, Troy, N. Y.